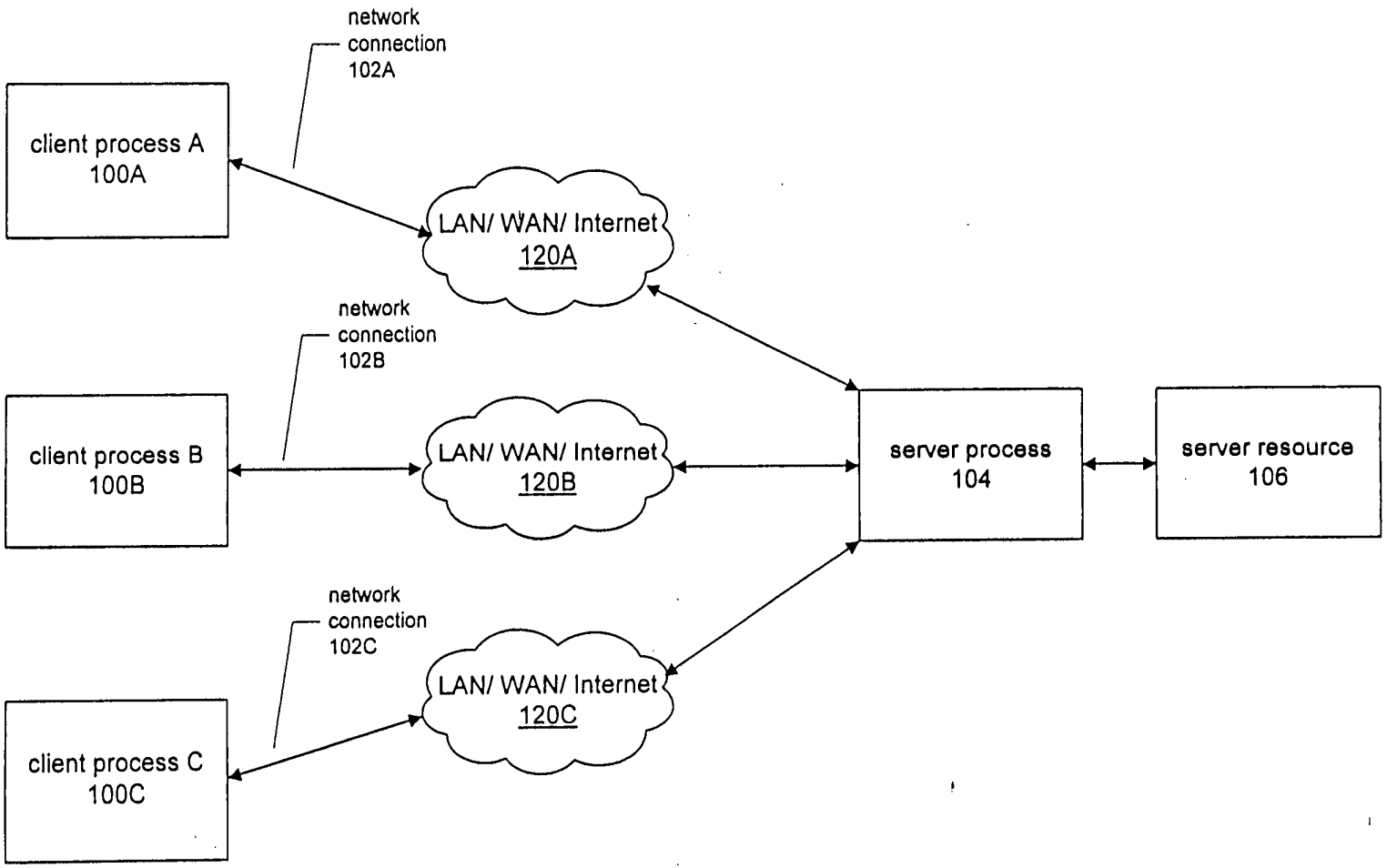

Figure 1
(PRIOR ART)

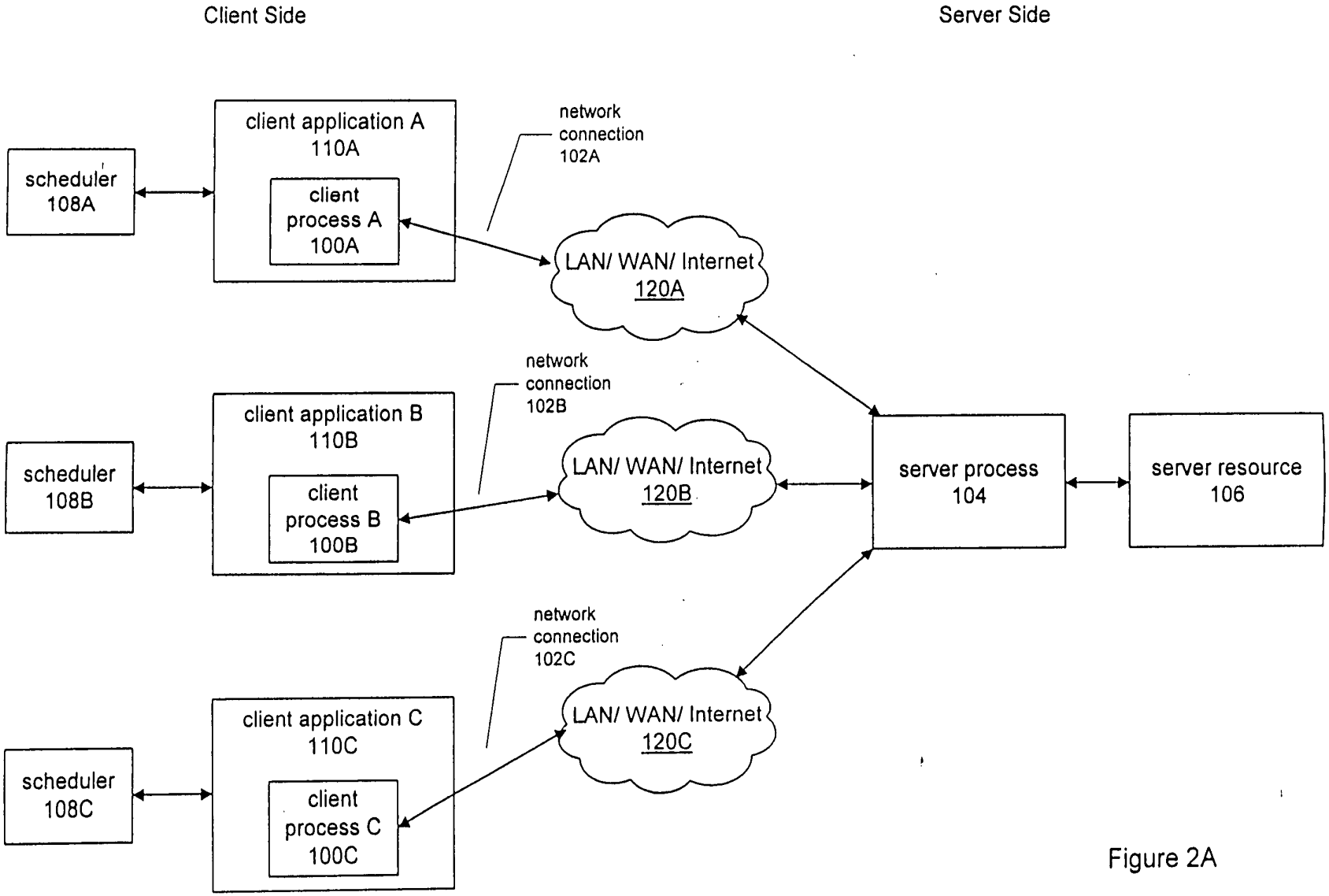
Client Side
Server Side
client application A
110A
client
process A
100A
scheduler
108A
network
connection
102A
LAN/ WAN/ Internet
120A
client application B
110B
client
process B
100B
scheduler
108B
network
connection
102B
LAN/ WAN/ Internet
120B
server process
104
server resource
106
client application C
110C
client
process C
100C
scheduler
108C
network
connection
102C
LAN/ WAN/ Internet
120C

Figure 2A

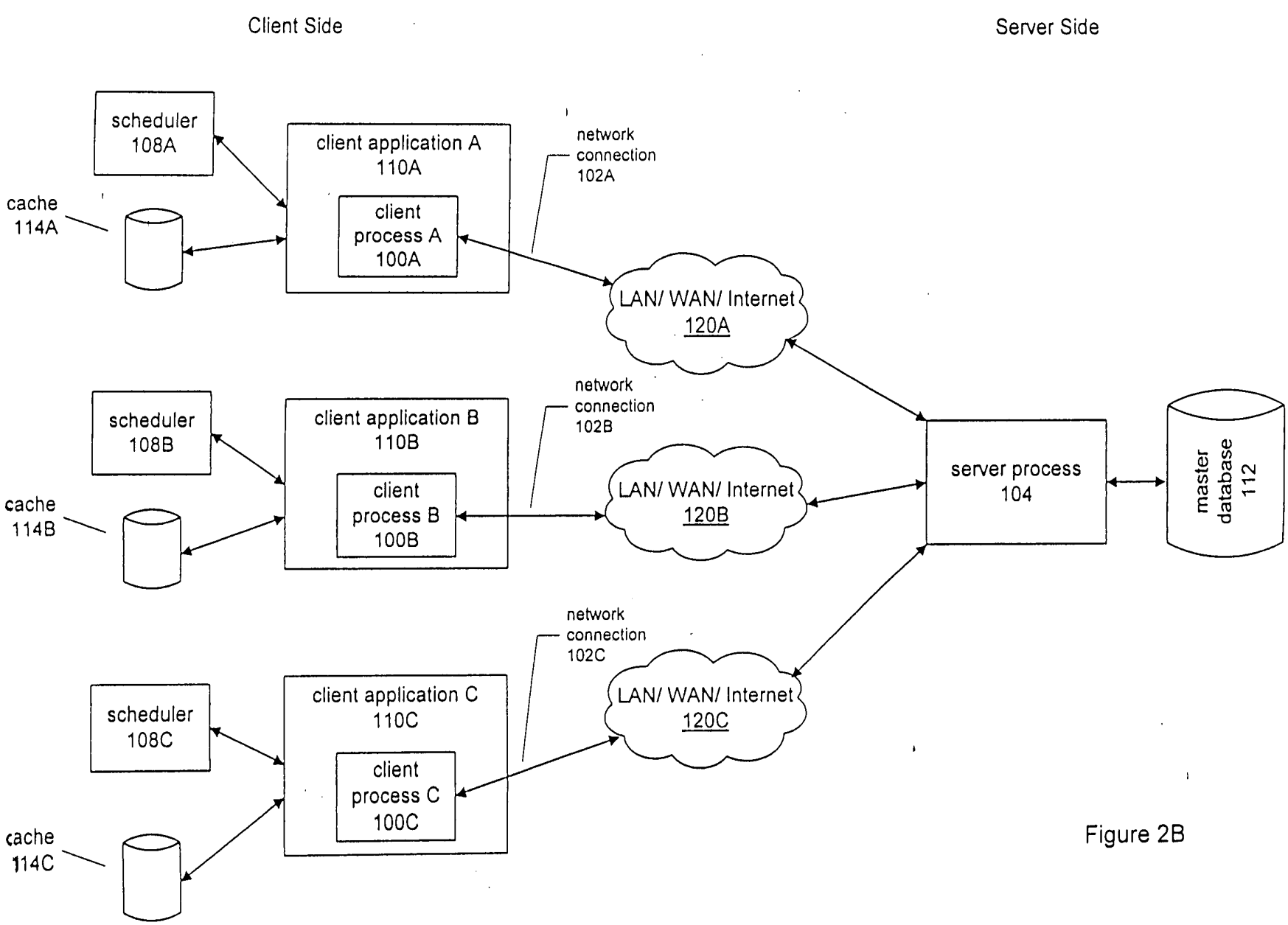
Client Side
Server Side
scheduler
108A
client application A
110A
client
process A
100A
network
connection
102A
cache
114A
LAN/ WAN/ Internet
120A
scheduler
108B
client application B
110B
client
process B
100B
network
connection
102B
cache
114B
LAN/ WAN/ Internet
120B
server process
104
master
database
112
network
connection
102C
scheduler
108C
client application C
110C
client
process C
100C
LAN/ WAN/ Internet
120C
cache
114C

Figure 2B

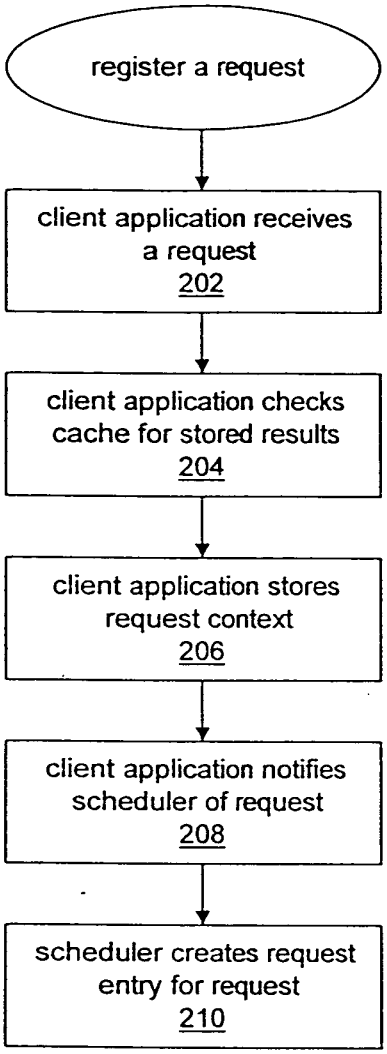
register a request
client application receives a request
202
client application checks cache for stored results
204
client application stores request context
206
client application notifies scheduler of request
208
scheduler creates request entry for request
210

Figure 3

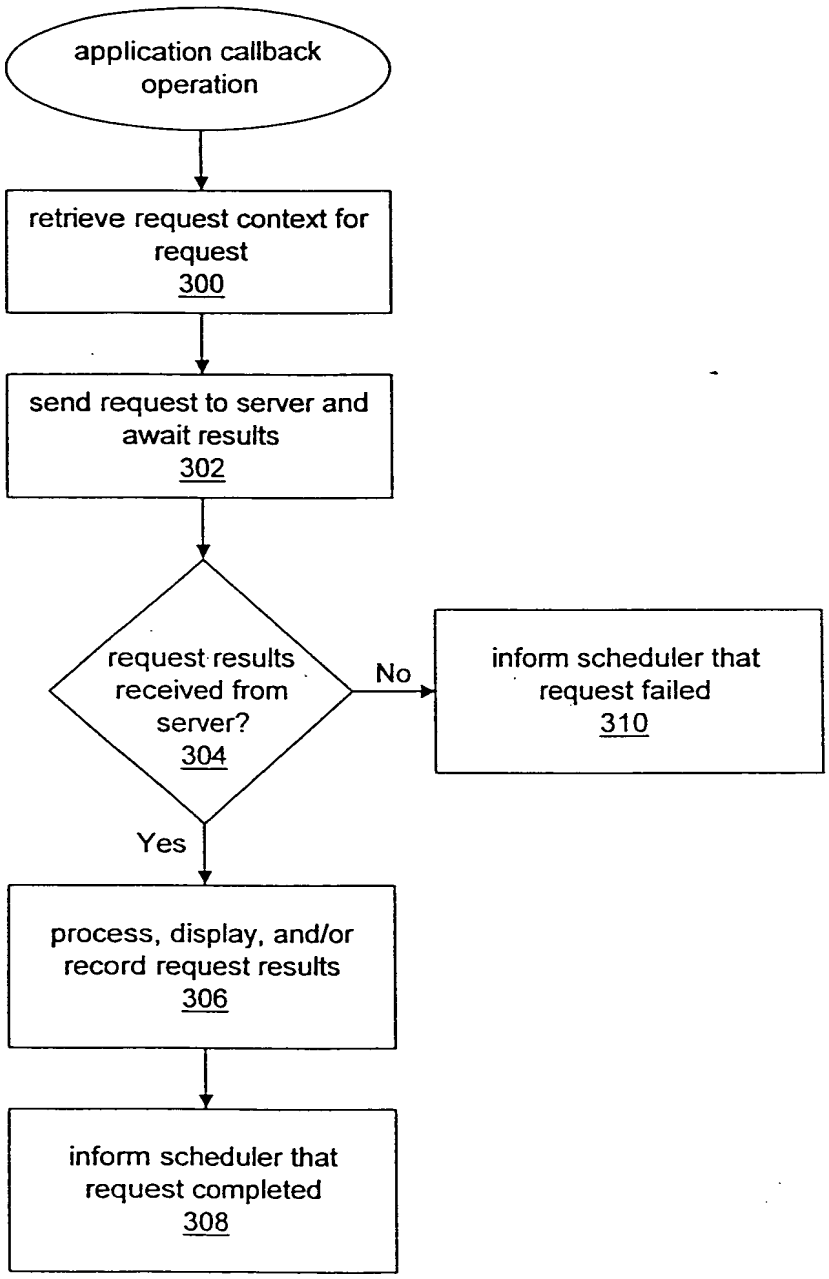
application callback operation
retrieve request context for request
300
send request to server and await results
302
request results received from server?
304
No
inform scheduler that request failed
310
Yes
process, display, and/or record request results
306
inform scheduler that request completed
308

Figure 4

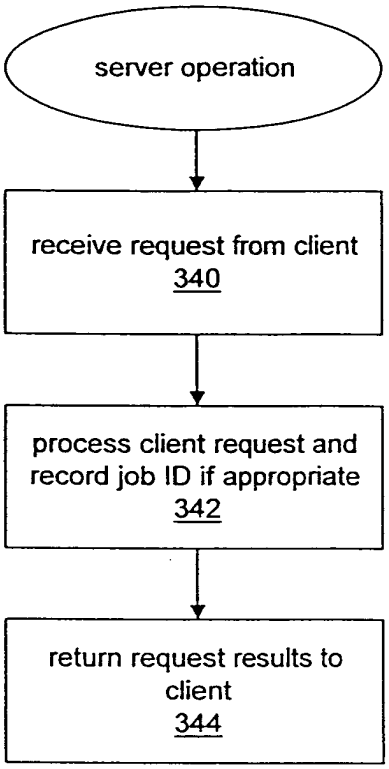
server operation
receive request from client
340
process client request and record job ID if appropriate
342
return request results to client
344

Figure 5

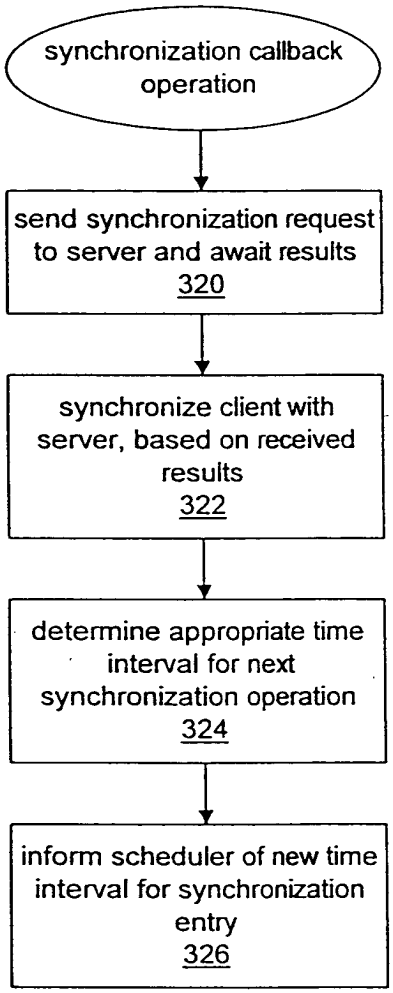
synchronization callback operation
send synchronization request to server and await results
320
synchronize client with server, based on received results
322
determine appropriate time interval for next synchronization operation
324
inform scheduler of new time interval for synchronization entry
326

Figure 6

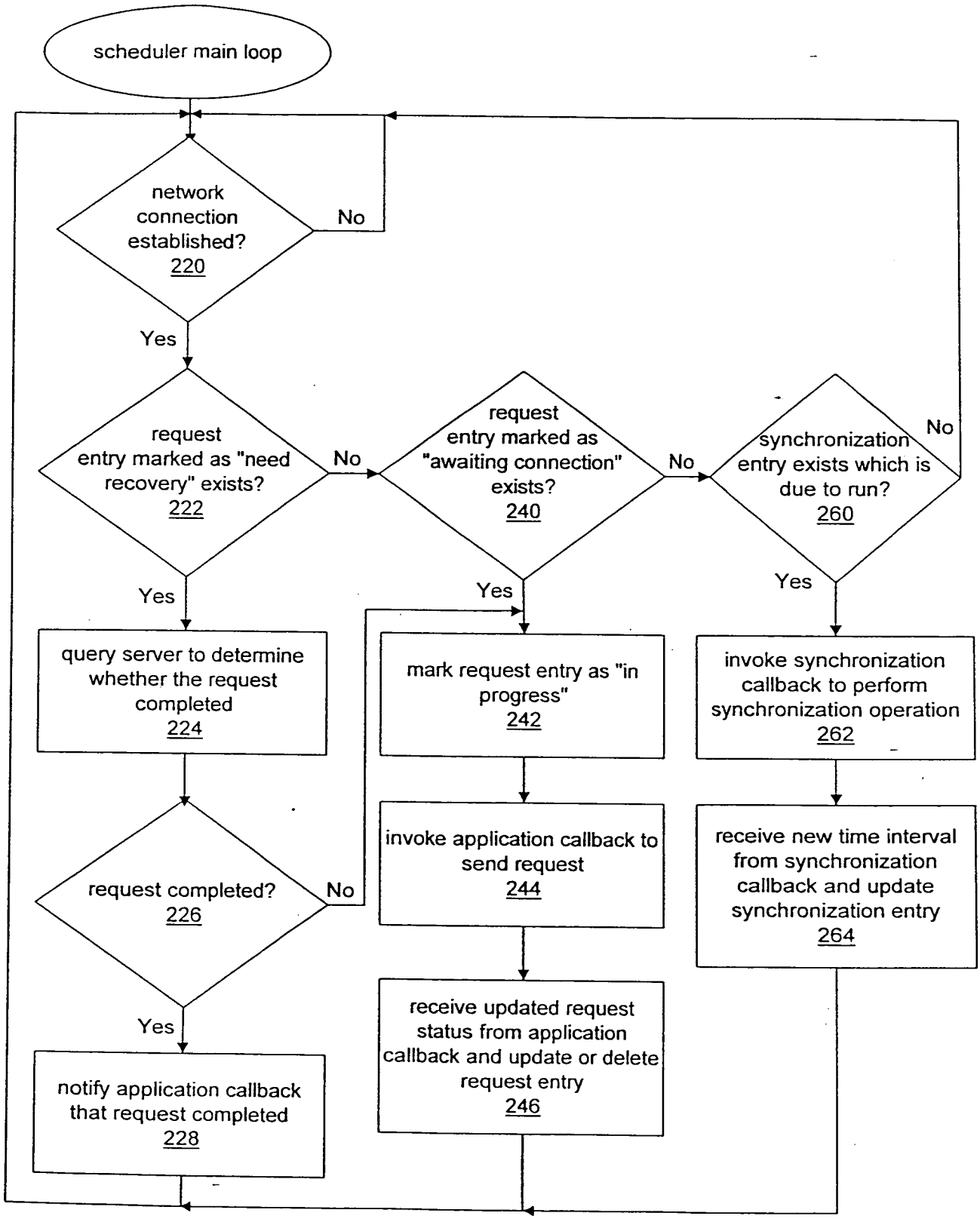
scheduler main loop
network connection established? 220
No
Yes
request entry marked as "need recovery" exists? 222
No
request entry marked as "awaiting connection" exists? 240
No
synchronization entry exists which is due to run? 260
No
Yes
Yes
Yes
query server to determine whether the request completed 224
mark request entry as "in progress" 242
invoke synchronization callback to perform synchronization operation 262
request completed? 226
No
invoke application callback to send request 244
receive new time interval from synchronization callback and update synchronization entry 264
Yes
receive updated request status from application callback and update or delete request entry 246
notify application callback that request completed 228

Figure 7

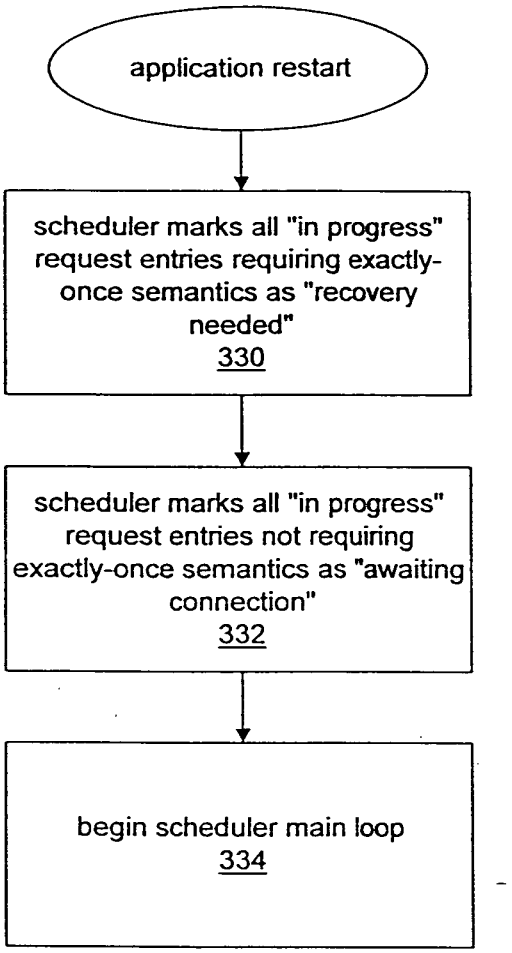
application restart
scheduler marks all "in progress" request entries requiring exactly-once semantics as "recovery needed"
330
scheduler marks all "in progress" request entries not requiring exactly-once semantics as "awaiting connection"
332
begin scheduler main loop
334

Figure 8

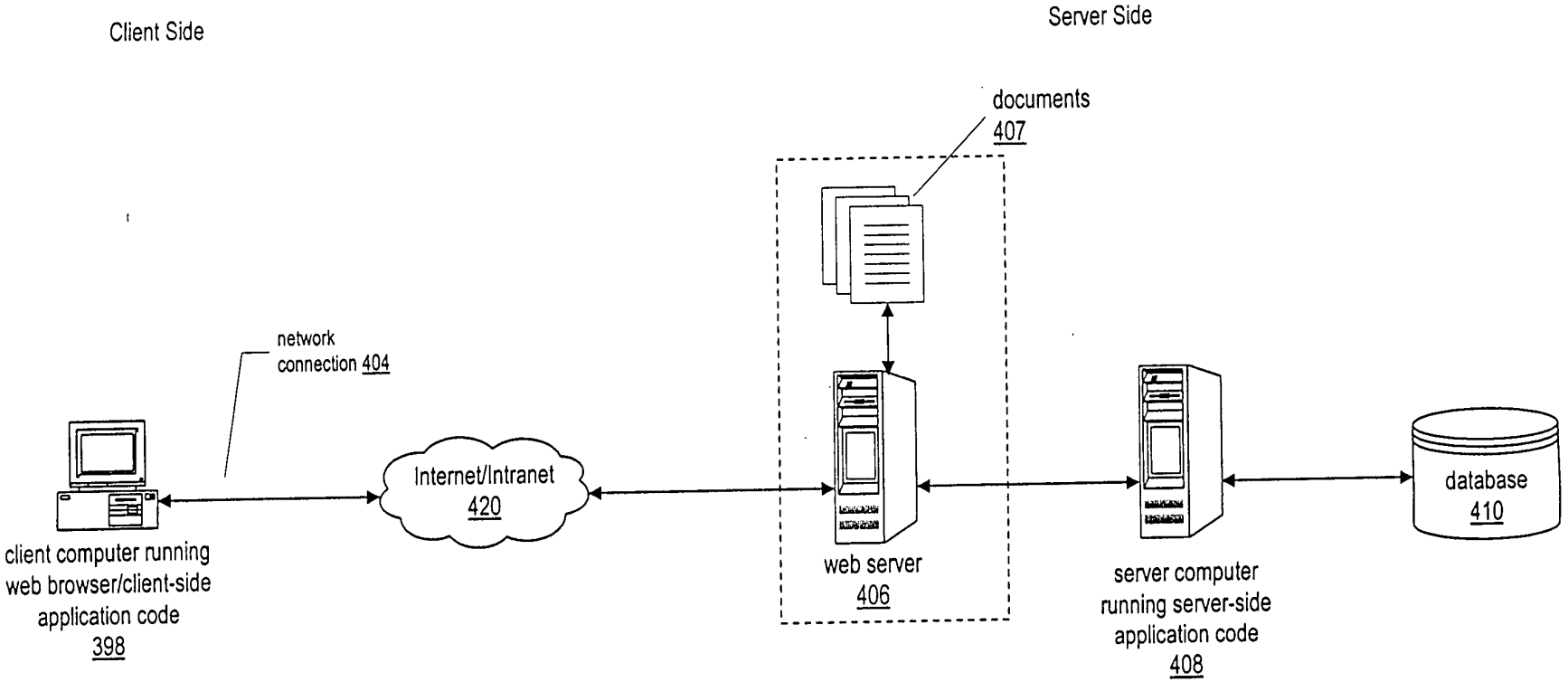
Client Side
Server Side
documents
407
network
connection 404
Internet/Intranet
420
client computer running
web browser/client-side
application code
398
web server
406
server computer
running server-side
application code
408
database
410

Figure 9A

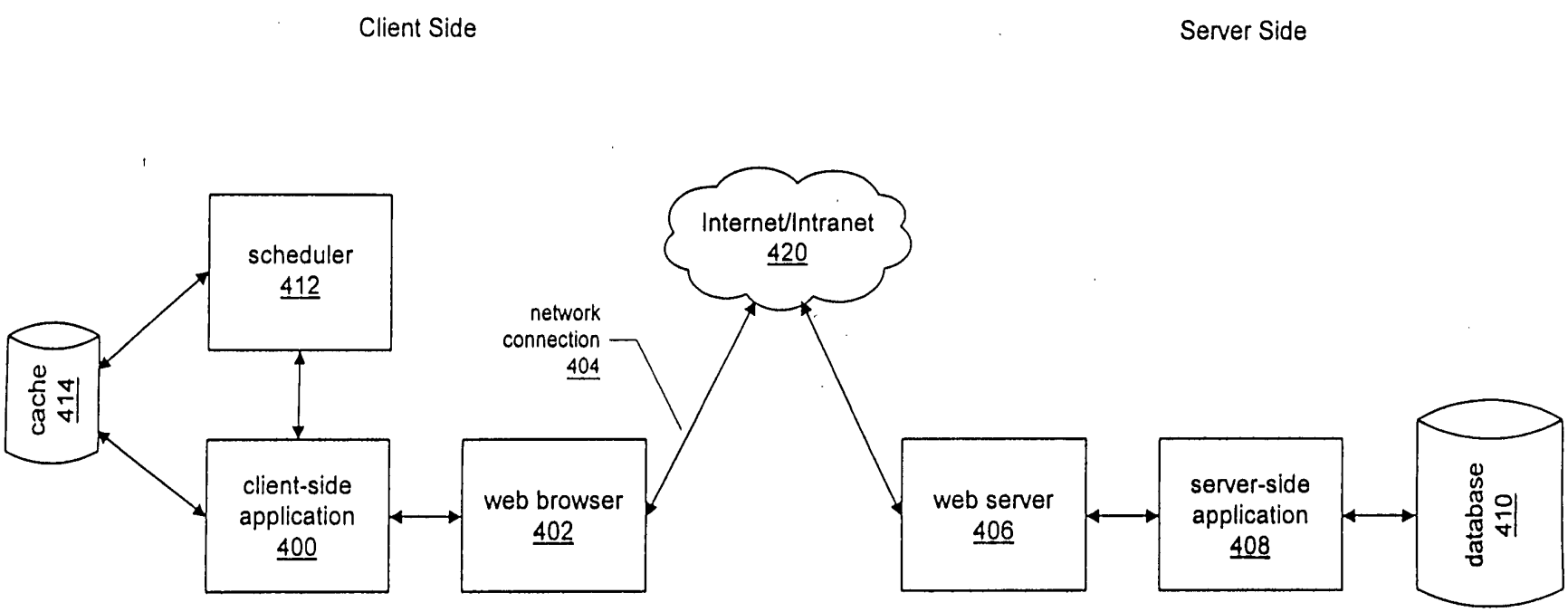
Client Side
Server Side
scheduler
412
cache
414
client-side
application
400
network
connection
404
Internet/Intranet
420
web browser
402
web server
406
server-side
application
408
database
410

Figure 9B